## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/13/2012 has been entered.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 27-29, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (Tanaka, US 6,116,035) in view of Menin et al. (Menin, US 5,970,732).

Regarding claims 27 and 31, Tanaka discloses a refrigeration plant and operating method (referring to figure 43), which comprises in a refrigeration circuit (A) a compressor (11), a condenser (14), an expansion valve (18a) and an evaporator (the combination of cooling heat exchanger 15 and cold heat source heat exchanger 2), which is passed through on its secondary side (cold heat source heat exchanger 1) by a secondary medium (via refrigerant circuit B) to be cooled down, whereby a heat exchanger (the combination of heating heat exchange heat exchanger 12 and hot heat source heat exchanger 1) is provided between a feed line (the line at the bottom of hot heat source heat exchanger 1) for the secondary medium and a refrigerant line leading to said expansion valve (the line at the top of heating heat exchanger 15), such that said heat exchanger is positioned directly upstream of the entrance of said expansion valve (illustrated in figure 43 & see column 63, lines 27-36). However, Tanaka fails to disclose that the temperature of the refrigerant at the entrance of the injection valve is kept constant. The general concept of maintaining the temperature of a refrigerant upstream of an expansion valve falls within the realm of common knowledge as obvious mechanical expedient and is illustrated by Menin (referring to figure 1) which teaches a thermal expansion valve (7) that maintains a constant temperature superheating value of a refrigerant vapor after a liquid separator (3) (see column 6, lines 31-34), and one having ordinary skill in the art would have been motivated to include the use of maintaining the temperature of a refrigerant upstream of an injection valve constant in order to control the superheat of the evaporator, thus ensuring efficient operation of the refrigerant plant.

Regarding claims 28 and 32, Tanaka further discloses that the mass flow of the cooled-down secondary medium is at least partly passed through the heat exchanger in counter-flow with respect to the refrigerant flow (illustrated in figure 43) by means of a first valve (the valve disposed above cold heat source side heat exchanger 2).

5. Claims 29, 30 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka as modified by Menin as applied to claims 27 and 31 above, and further in view of Aflekt et al. (Aflekt, US 7,574,874).

Regarding claims 29, 30 and 33, Tanaka as modified by Menin teach all the limitations of the claimed invention, but fails to teach that the refrigerant leaving said evaporator is passed through an internal heat exchanger, and whereby a second valve is provided between said refrigerant line leading to said expansion valve and said internal heat exchanger, such that a predetermined part of the refrigerant mass flow is passed through said internal heat exchanger, while the remaining mass flow is directly conducted to said expansion valve, to additionally keep the temperature of the refrigerant at the entrance of the expansion valve. Aflekt teaches (referring to figure 3) an internal heat exchanger (5) positioned downstream of an evaporator (4), and a three-way valve (6'') positioned between a valve (expansion valve 3) and a refrigerant line leading to the internal heat exchanger (the line at the bottom of the three-way valve). It is noted that a user would know the predetermined amount of refrigerant flow passing through the three-way valve based on the specifications of the refrigerant circuit of Aflekt. Also, the three-way valve would inherently aid in keeping the temperature of the refrigerant entering the expansion valve constant, since some of the refrigerant is allowed to bypass the expansion valve.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the refrigerant plant of Tanaka as modified by Menin to include the internal heat exchanger and three-way valve as taught by Aflekt in order to control the superheat of the compressor, thus ensuring efficient operation of the refrigerant plant.

***Response to Arguments***

6. Applicant's arguments filed 1/13/2012 have been fully considered but they are not persuasive.

**On pages 6 & 7 of the Applicant's remarks, the applicant presents the following arguments pertaining to the rejection of claims 27-29, 31 and 32, more specifically, independent claim 27:**

(a) Turning to the prior art, nowhere does Tanaka disclose or even suggest that its motor-operated control valve is equivalent to the claimed expansion valve. Instead, as Applicant has previously argued, valve is a control valve, which in a usual way controls the mass flow in the bypass line leading to the heat exchanger 14.

(b) While Tanaka teaches an expansion valve (13), the heat exchanger (12) is not directly positioned upstream of the entrance of this expansion valve, as expressly required in independent claims 27 and 30. Additionally, the Menin patent fails to cure this deficiency of Tanaka. The Menin patent shows in Fig. 1 a refrigeration circuit with a compressor (1), a condenser (2), an expansion valve (7), and an evaporator (30). However, Menin's expansion valve (7) maintains a constant temperature superheating value of the refrigerant vapor after liquid separators (3) (column 6, lines 31-33). Therefore, a secondary medium is not involved, unlike in the claimed

method and system. The Aflekt patent is cited for the teaching of an internal heat exchanger and similarly fails to overcome the deficiencies of Tanaka and Menin.

(c) As a result, Applicant believes that the proposed combinations of the Tanaka, Menin, and Aflekt patents does not teach or suggest the subject invention. As noted above, Tanaka fails to show a heat exchanger directly at the entrance of the expansion valve, while Menin discloses a liquid separator 3 operating without a secondary medium.

(d) Accordingly, Applicant respectfully submits that, for at least the foregoing reasons, the amended independent claims 27 and 31 are not rendered obvious over the proposed combination of the prior art references. Because claims 28-30 and 32-33 depend on and include all of the limitations of the amended independent claims, these dependent claims are believed to be patentable for at least the reasons discussed above in connection with independent claims 27 and 31.

In response to argument (a), the Examiner respectfully disagrees. Figure 43, not figure 44 of Tanaka is relied upon in the rejection of claim 27. Motor-operated valve 18a is now relied upon as reading on the claimed expansion valve. As disclosed in column 63, lines 2-3, motor-operated valve 18a is an expansion mechanism.

In response to argument (b), the Examiner respectfully disagrees. Incorporating the Examiner's response to argument (a), as shown in figure 43 and as disclosed in column 63, lines 27-36 of Tanaka, refrigerant would flow from compressor 11 to heating heat exchanger 12 to motor-operated valve 18a, thus showing that heating heat exchanger 12 is positioned directly upstream of motor-operated valve 18a. Also, the Menin & Aflekt references were not relied upon for the teaching on an injection valve.

In response to argument (c), the Applicant is advised to see the Examiner's response to the arguments set forth in sections (a) & (b). Therefore, the combination of the Tanaka, Menin, and Aflekt references in the rejection of claim 27 is proper.

In response to argument (d), the Applicant is advised to see the Examiner's response to the arguments set forth in sections (a) - (c). Therefore, since the rejection of claim 27 has been shown to be proper, the rejections of claims 28-33 are also proper.

In conclusion, for at least the reasons stated above, the Examiner respectfully submits that the rejections of the pending claims are properly upheld.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AZIM RAHIM whose telephone number is (571) 270-1998. The examiner can normally be reached on Monday - Thursday 7am - 2pm EST and Friday 7am - 11am EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frantz Jules can be reached on 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

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/A. R./
Examiner, Art Unit 3744
2/14/2012

/Frantz F. Jules/

Supervisory Patent Examiner, Art Unit 3784